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THE FUTURE OF CRYPTO-CURRENCY IN THE ABSENCE OF REGULATION, SOCIAL AND LEGAL IMPACT

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Abstract

The Internet revolution is fast outpacing the law and creating a newer world with the momentum of gripping the unwary crowd into a boundless world of anarchism. Money is defined as a medium of exchange, store of value, and a unit of account (www.cliffnotes.com Date of use: 28/10/2017). Crypto-currency is a new wake in the digital reality that is performing the above functions of money. There are about 1,541 crypto-currencies traded in 8,894 markets by exchangers (www.coinmarketcap.com Date of use: 28/01/2018). Prominent among these crypto currencies, is the Bitcoin which as a single coin had a monetary value of \$0.05 USD in July 2010 and in November 2017, was valued at \$18,000 (www.useyourselfmedia.today Date of use: 28/10/2017). The drivers of crypto-currencies are basically the block-chain which is a technology, others are the exchanges, financial services provider, wallet services provider and miners. Under most jurisdictions, the exchanges and service providers are either not regulated or partially regulated. Regulations in the financial sector, are tools used in monitoring the movement of funds, fraud, financial crimes and money laundering, criminal activities, as well as the protection of consumers. In the absence of regulation, this paper seeks to examine the trend and legality of the crypto currency as a virtual currency and its current and future impact on the society. To achieve this, some monetary regulations will be evaluated and an attempt will be

made to adapt these regulations to the crypto-currency framework. At the end of the paper, challenges will be identified with a view to recommending a regulated regime in the use of crypto-currencies for a safer society and consumer protection.

Keywords

Block Chain, Initial Coin Offering (ICO), Virtual Currency, Exchanger, Wallet Services Provider (WSP)

1. Introduction to Crypto-currency

Crypto-currency is “a digital representation of value that is neither issued by a central bank or a public authority, nor necessarily attached to a fiat currency, but is accepted by natural or legal persons as a means of payment and can be transferred, stored or traded electronically” (European Commission Proposal for amending EU Directive 2016). It is a math based, decentralised, convertible, virtual currency that is protected by cryptography (Financial Action Task Force, 2014). Cryptography involves creating written or generated codes that allow information to be kept secret (www.techopedia.com date of use: 28/01/2018). The European Central Bank defines virtual currency as “a type of unregulated, digital money, which is issued and usually controlled by its developers, and used and accepted among the members of a specific virtual community.” From the definition of the European Central Bank, crypto-currency can also be defined as digital money. Digital money or currency is a form of virtual currency that is electronically created and stored. Some types of digital currencies are crypto-currencies, but not all of them are. A crypto-currency is a subset of digital currency that uses cryptography for security so that it is difficult to counterfeit; they are particularly not issued by any central authority and have thus remained unregulated and anonymous. Crypto-currency is a form of electronic money, distinct from electronic payment systems as it is not linked to conventional banking platforms, it is not a legal tender and can only be used within accepted platforms particularly, peer-peer. It is based and built on block-chain technologies and more recently, another technological revolution known as the ‘blockstream.’ Block-chain enables the creation of decentralised currencies, self-executing digital contracts also known as smart contracts and intelligent assets (smart property) (Aaron & Primavera, 2015).

1.1 Conventional Money and Crypto-currencies

According to the US Financial Crimes Enforcement Network (FinCEN 2014) money or currency is defined “as the coin and paper money of the United States or of any other country

that is accepted as a medium of exchange in the country of issuance.” That is ‘fiat money,’ money that is backed by Government regulations. Money is a social convention which evolved as a solution to the problems of indivisibility associated with the trade by barter system. Early trade was powered by the barter system but this system was hampered by the challenges of double co-occurrence of want between sellers and buyers. With the advent of commodity money, it was more convenient for authorities to mint money in preferred denominations thereby allowing divisibility (Michelle, 2004). The use of commodity money was closely followed by convertible paper money, the use of promissory notes, bills of exchange and payment cheques.

Following the influx of technology, financial transactions could be effected over the Internet; this gave room for e-money transfers, credit and debit cards and the use of Automated Teller Machines. With the unprecedented growth of technology, more digital cash solutions were experimented. Foremost among these were the DigiCash and CyberCash however, these cash systems did not survive long (The Economist, 2000) and they were followed by PayPal which succeeded. The failure of DigiCash and CyberCash can be traced to the peculiar nature of e-cash wherein, the currency is not a legal tender in any jurisdiction but only used in closed circles. PayPal however, succeeded due to its wide use in eBay auction site, which later acquired it.

Defining electronic money has been subject to various criteria; it has been suggested that its definition should be according to its technical implementation. It could also be defined based on the institutional arrangements required to support it, and the way in which its value is transferred. Another criterion for its definition can be linked to the recording of the transactions and the currency of denomination (Basel Committee of the Bank of International Settlements, 1996). In a 1996 document, the European Monetary Institute defined e-money as “an electronic store of monetary value on a technical device that may be widely used for making payments to undertakings other than the issuer, without necessarily involving bank accounts in the transactions, but acting as a prepaid bearer instrument.” It must be noted that, prepaid e-money instruments can be balance based or token based in the form of cards or tokens and are essentially access products and not digital money (BIS 1996). E-money could also be in the form of e-purses which are hardware or card based or as digital cash which are most often software or network based (The Basel Committee, 1998).

While some considered the widespread adoption of e-money system to be a distant prospect (Odlyzko, 2003) it was advocated that privately managed money could lead to *laissez*

faire capitalism (Dorn, 1997). In 2008, a peer-to-peer version of an electronic cash allowing direct online payments without the intervention of any financial institution was created. It works using cryptography to secure transactions instead of trust. This has resulted in the use of the word “crypto-currency” for all networks and mediums of exchange using cryptography to secure its transactions (Michael et al.,2015). However, for e-money or crypto-currency to be sustained it must be efficient, widely acceptable, secured, anonymous, and easily transferable (Michelle, 2004).

1.2 Types of Crypto-Currencies

From 2008 to date, there are about 1,541 crypto-currencies (www.coinmarketcap.com Date of use: 28/01/2018). They are traded regularly on the floor of the exchanges and most are introduced to the public through initial coin offering (ICO) whereby the coin is offered at a particular value during a limited period after which a higher value is speculated as its public offering. The currencies include the Bitcoin-BTC, Zcash-ZEC, Ripple-XRP, Ethereum-ETH, Litecoin-LTC, Monero, Dash, ReddCoin, Neblio, Ethos, Bitcore, Pillar, Dent, FunFair, Polymath, amongst others. Bitcoin is the 1st and most valued decentralised crypto-currency, it was created by unknown programmer who used a pseudo name “Satoshi Nakamoto” in order to remain anonymous. It was first traded in 2009 and was followed by Namecoin in April, 2011. The aim was to take power out of the hands of Government and put back into the hands of the people. There are about 12 million Bitcoins in circulation and as of February, 2018 each is valued at about \$9000. Majority of crypto-currencies are largely clones of Bitcoin or other crypto-currencies and are referred to as alt coins. They feature different values in terms of block time, currency, supply and issuance scheme (Garrick & Michel, 2017).

2. Valuation of Crypto-Currencies

It is important to identify the level of acceptance of this monetary evolution in predicting its future. Before concluding on its value, some indices are actors in building up the value of the crypto-currency, for the purpose of this paper, the Bitcoin will be used as a case study. These indices include, perception, limited supply and demand, energy factorisation, block-chain difficulty level, utility of the currency, price of Bitcoin, media hype, investors, scam, legal/government issues, technological innovation and advancement, volatility and confidence in the system based on stability of the Bitcoin network (www.cryptocoinsnews.com., www.totalbitcoin.org Date of use: 16/02/2018).

Most consumers have digital cash as a speculative asset based on perception gained through other factors. The value of Bitcoin is heavily influenced by the level of demand and supply at the exchange market especially as the total number of Bitcoins in circulation cannot exceed 12 million. The utility of the currency affects its acceptability since its core value is in ease of use, storage and security. Some markets accept Bitcoin on their platforms, with the crypto-currency, houses can be purchased (see www.brickblock.io Date of use: 20/12/2017), air tickets can be ordered at www.cheap-air.com (simply click on the help menu on the payment form and go to alternative payments. Date of use: 16/02/2018). KFC Canada also sells chicken with Bitcoin. The value of a crypto-currency is also largely affected by the free use of social and conventional media in reporting crypto-based activities. Banning the use of crypto-currency through national law and hacking activities has the capacity of making the crypto-market volatile and could bring down its value at the exchange market while in the same way, making the currency a legal tender within a jurisdiction will no doubt lead to an upsurge in price.

Table 1

#	Name	Market Cap	Price	Volume (24h)	Circulating Supply
1	Bitcoin	\$171,066,679,657	\$10,141.80	\$8,896,120,000	16,867,487 BTC
2	Ethereum	\$91,367,131,357	\$935.73	\$2,868,810,000	97,643,144 ETH
3	Ripple	\$44,228,648,917	\$1.13	\$1,004,400,000	39,009,215,838 XRP *
4	Bitcoin Cash	\$26,057,470,343	\$1,535.51	\$760,370,000	16,969,913 BCH
5	Litecoin	\$11,850,968,170	\$214.55	\$1,560,030,000	55,236,908 LTC
6	Cardano	\$10,399,555,409	\$0.401108	\$278,755,000	25,927,070,538 ADA *
7	Stellar	\$8,308,510,535	\$0.450630	\$94,258,400	18,437,544,183 XLM *
8	NEO	\$7,992,530,000	\$122.96	\$205,489,000	65,000,000 NEO *

Figure 1: Market Capitalisation of Crypto-currency 16th February, 2018 (1st Page) Total Market cap was \$478,885,948,636 16th February, 2018 © 2018 CoinMarketCap.

3. Drivers and Industry Sectors of Crypto-currency

Crypto currency is a derivative and not a commodity and therefore relies on certain drivers and industry sectors to function. These are the block-chain technology, mining technology, exchanges, payment services providers and wallet services' providers.

3.1 Block Chain Technology

Online transactions are carried out intrinsically on trust relying on third parties such as service providers, merchants, and governmental agencies to protect personal data and execute transactions. In the financial sector, the third party is a central authority such as banks and regulated financial institutions. In crypto currencies, the cryptographic proof is used instead of trust. Each transaction is protected through a digital signature where each transaction is sent to the "public key" of the receiver digitally signed using the "private key" of the sender. Each transaction is broadcast to every node in the network (the nodes refer to every computer in the network) and recorded in a public ledger after verification (Micheal et al., 2015).

With the requirement of a "proof of work" by nodes which generate blocks, a successful block will be accepted in the block chain. A block chain is built through transactions that are placed in groups of blocks and then linked as a block chain. The transactions in one block are presumed to have happened once and are linked together in a linear and chronological order with each block containing the hash of the previous block (Micheal et al., 2015). The block chain is therefore, a distributed and decentralised ledger, enabling autonomous and automated transactions based on consensus agreement. This ledger could be permissioned (open to anyone) or permissionless (restricted to members of a club or group only). It is applicable to any digital asset transaction exchanged online (Micheal et al., 2015).

In building the block chain, the network accepts only the longest block chain as the valid one. It is therefore impossible for a hacker to introduce a fraudulent transaction since it has not only to generate a block by solving a mathematical puzzle but it has to at the same time mathematically race against the good nodes to generate all subsequent blocks in order to gain acceptance as the valid block. The difficulty is further aggravated since all the blocks in the block-chain are cryptographically linked together (Micheal et al., 2015).

Find in the table below, how the block chain works:

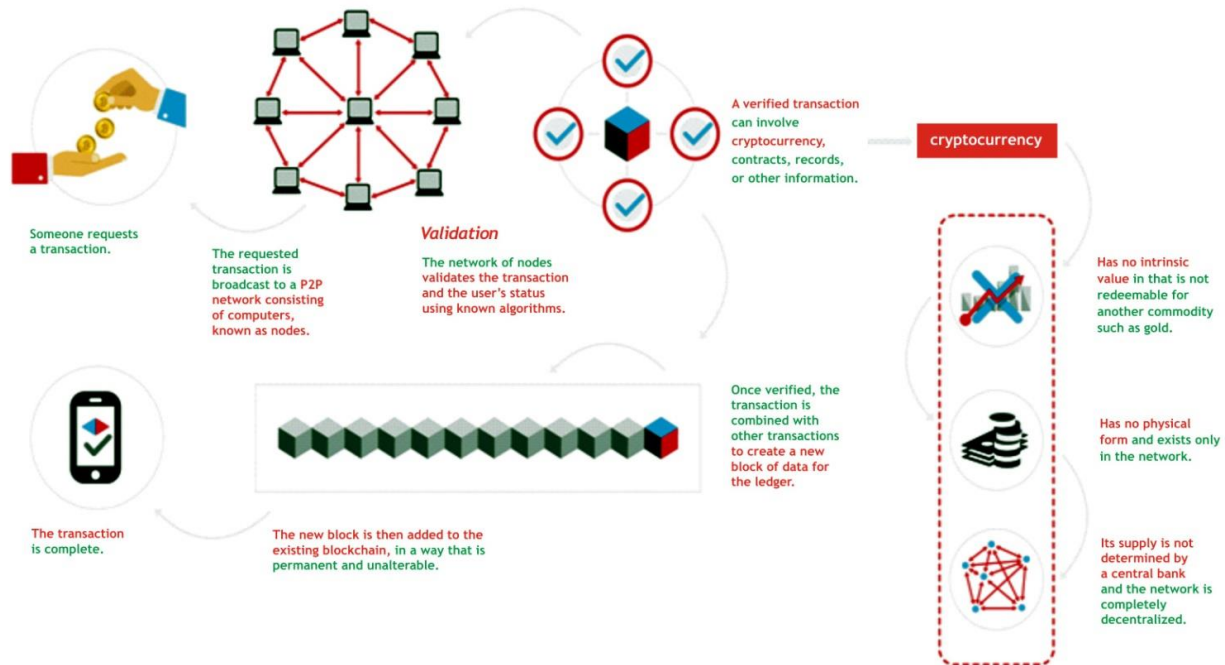


Figure 2: Courtesy, Google images, www.googleimages.com (Date of use: 15/02/2018)

3.2 Mining Technology

Mining refers to the validation of a pool of transactions by adding new blocks on the block-chain (ENISA Opinion Paper, 2017) It is the process of adding transaction records to the public ledger of past transactions through a mining rig. A mining rig is a computer system that does the mining. It is done better and faster with a graphics processing unit (GPU) than with a central processing unit (CPU) (www.asonline.com Date of use: 16/02/2018). Mining requires resources so that the number of blocks mined per day will be consistent enough to add to the block-chain.

3.2.1 Types of Mining

- (a) Self-Mining: This involves the use of a mining equipment/hardware by an individual to find a valid block.
- (b) Cloud Mining: In this case, the equipment and hashing power is not owned by the individual but rented from remote hosting services
- (c) Group Mining/Mining Pool: Rather than working alone with limited ability to find a valid block, a group of individuals or miners could work together to find a valid block and thereafter, share the profit. Mining takes a lot of power source and from a US case, has

the capacity to interfere with telecommunications equipment. On the 16th of February, 2018 the Covington Financial Services reported that the Federal Communications Commission (FCC) sent a letter to an individual in Brooklyn, New York, alleging that a device within the premises of the individual used in mining Bitcoin was generating spurious radiofrequency emissions which was interfering with a portion of T-Mobile's mobile telephone and broadband network. (see www.covfinancialservices.com Date of use: 28th February, 2018).

3.3 Exchanges

The role of an exchange house or exchanger is strategic in the valuation and sustenance of the crypto-currency. New crypto-currencies must be offered to the public through the ICO before they are listed on the exchanges. An exchange is an entity engaged as a business in the exchange of virtual currencies, denomination of local currency for crypto-currency and vice versa, and exchanges of one virtual currency to another (FinCEN 2014). Most exchanges also act as wallets and money remitters or payment providers.

Exchanges could be:

- Order-book exchanges, which use trading engines to match buy and sell orders from users.
- Brokerage services, which are services that allows users to conveniently acquire and/or sell crypto currencies at a given price.
- Trading platforms, which provide a single interface for connecting to several other exchanges and/or offer leveraged trading and crypto currency derivatives.
- Custodial exchange, which takes custody of users' crypto-currency funds (Garrick & Michel 2017).

3.4 Payment Services

Payment service providers facilitate payment of crypto-currencies to national currencies, they also facilitate payments of one type of crypto-currency to another type, and crypto-currencies to commodities for national and cross border transactions. Payment services actually carry out money transfer services and give effect to B2B Payments; merchant Services and provide a platform for crypto-currencies, generally (Garrick & Michel, 2017).

According to a report of the Global Crypto-currency Benchmarking Study carried out in 2017 by Garrick & Michel, 86% of surveyed payment companies use the Bitcoin network as

their main payment rail for cross border transactions, they use 3% of traditional payment network and 11% use of other crypto-currencies in making cross border transfer. This trend can be easily understood when the near zero cost of transfers could be possible through the use of reputable crypto-currency payment network in comparison with the traditional payment network and its high transaction cost.

Using the Bitcoin to make payment is gradually gaining credibility as withdrawals can be made through Bitcoin ATM machines and through national currencies. The diagram below being part of the data collated at the study of Dr. Garrick and Michel, shows the exchange frequency of Bitcoins to national currencies according to the different jurisdictions.

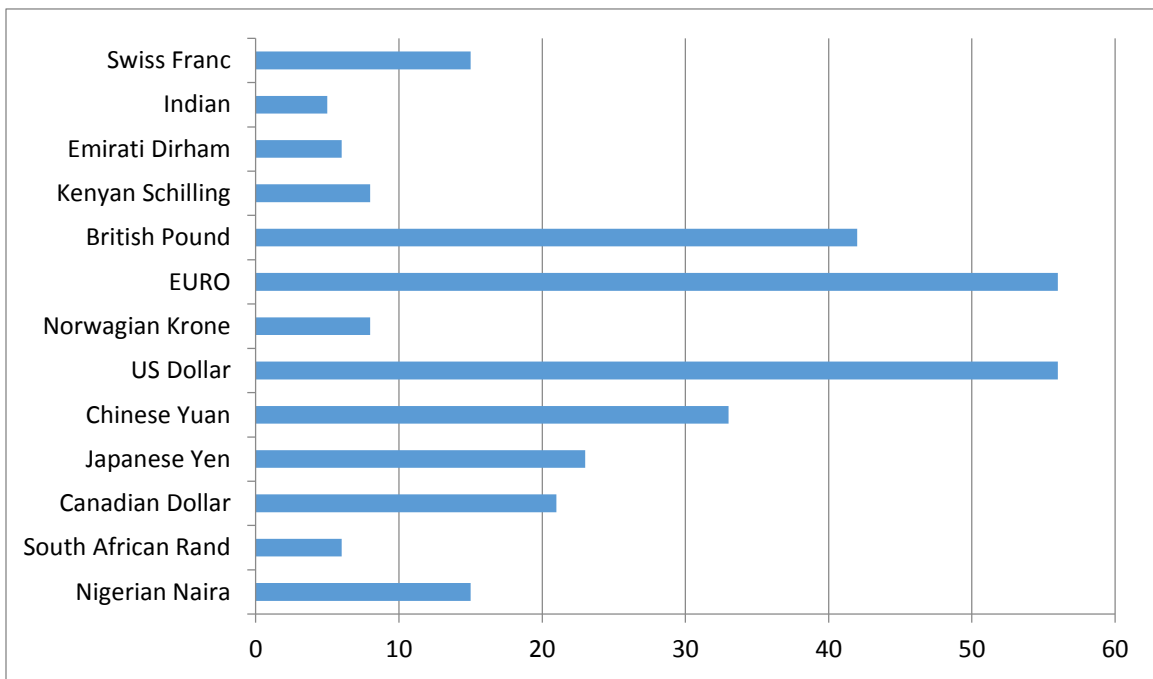


Figure 3: Conversion rate of bitcoins to national currencies in some jurisdictions

3.5 Wallets

A wallet is generally a software program that is used to securely store, send and receive crypto-currencies through the management of private and public cryptographic keys. The wallet is simply where the public address (a place to receive the crypto-currency) and the private address (a place to spend or send the crypto-currency) is stored. Wallets are more in the form of softwares and could be incorporated wallets, custodial wallets, integrated wallets and self-hosted

wallets. There are also non-software wallets such as paper and brain wallets (Garrick & Michel 2017). The different wallets are mentioned below:

(a) Incorporated Wallets:

These wallets are managed by large and registered cooperations

(b) Custodial wallets:

They are wallets with their private keys securely kept in the server of the service institution or company

(c) Integrated wallets:

These are wallets that provide currency exchange services within the wallet interface using any of the underlisted exchange models:

- Centralised exchange/brokerage service model where the wallet provider acts as the central authority
- Integrated third-party exchange model where wallet provider partners with third-party exchange to provide exchange services
- P2P exchange/market place model where wallet provider offers a built-in P2P exchange that lets users exchange currencies between themselves (Garrick & Michel 2017).

(d) Self-hosted wallets:

These are wallets that allow users to control their funds anywhere and at any time since they have their private keys personally protected.

In terms of location, wallets could be mobile wallets; desktop wallets; hardware wallets (cold storage/offline); or web/hot/hosted/online wallet (www.coinsutra.com Date of use: 16/02/2018). It is estimated that between 5.8 and 11.5 million wallets globally, are active (Garrick & Michel 2017).

4. The Future

Crypto currency is perceived by many as an illusion and a passing phase unless it becomes a fiat currency. Fiat currencies are determined nationally or regionally and there are no inclinations for a global currency. People will definitely use e-money if they believe that trustworthy, long-lasting and powerful institutions are supporting it (Goodhart, 2000). While the speculation about the use, value and sustenance of crypto- currencies persists, it is important to consider its current use in the society today which in turn, affects its value.

4.1 Regulation

Crypto-currencies are naturally not regulated. Their use may however, be made officially recognized or banned in a country. While some countries have banned the use of crypto-currencies in their jurisdiction, some have created their own crypto or digital currency and legalized its use in their country. Many countries are silent on its usage and that has left the consumers skeptical in approaching the new revolution. From the preceding paragraphs however, it is shown that there has been significant use of the currency and that there is need for regulation. This paper has established that the currency is used under 4 main categories as itemized below:

- (a) Speculative Digital Asset
- (b) Medium of exchange
- (c) Payment rail
- (d) Non-monetary use cases (Garrick & Michel, 2007)

Though not regulated directly, there is a case that the wallet and exchange institutions should be subject to comprehensive regulation, the details of which are not within the scope of this paper. Where for instance, a payment services provider (PSP) wishes to operate in the United Arab Emirates (UAE), it must apply to the Central Bank for the appropriate license. This is not the case in most countries as the PSPs are not exactly captured as money remitters within the ambit of the law. In the case of the US for instance, a case came up that necessitated a look into the activities of money transmitters and PSP with a view to bringing them within regulation. In response the FinCEN defined Money Transmission and listed exemptions therein:

On July 21, 2011, FinCEN published a final ruling amending definitions relating to money services business (MSB) rule. It defined an MSB as

“A person wherever located doing business, whether or not on a regular basis or as an organized or licensed business concern, within the United States.”

In crypto currency, the exchanger converts the customer’s real money into virtual money and then transmits the money to a merchant.

A money transmitter is a person that provides money transmission services or is engaged in the transfer of funds. Money transmission services “ means the acceptance of currency, funds,

or other value that substitutes for currency from one person and the transmission of currency, funds or other value that substitutes for currency to another location, or person by any means.”

FinCEN stipulates four conditions which must apply to a payment processor in order not to be exempted from the BSA-regulated financial institutions’ provision (in this case, crypto-currency i.e. Bitcoin).

- (a) The entity providing the service must facilitate the purchase of goods or services, or the payment of bills for goods or services (other than the money transmission itself).
- (b) The entity must operate through clearance and settlement systems that admit only BSA – regulated financial institutions.
- (c) The entity must provide the service pursuant to a formal agreement.
- (d) The entity’s agreement must be at a minimum with the seller or creditor that provided the goods or services and receives the funds.

Looking at the conditions, a PSP under the crypto-currency framework will not scale through regulation, based on sub paragraph (b). There is need therefore for amendment, as the same situation is applicable in Nigeria and many other countries where the definition of money transmitters is restrictive and cannot embrace PSPs without an amendment of applicable laws.

4.2 Advantages and Disadvantages of Using Crypto-Currency

The currency is available at reduced cost since there is no printing of paper. There is also reduced transaction cost especially with the elimination of a third party mediator. Furthermore, the use of crypto-currencies will substantially minimize credit card fraud and identity theft as most transactions will be done through the crypto-currency. It also has its disadvantages and these are high volatility due to increased spending. There could be delay in the network based on congestion, and quite burdensome, there might be difficulty in spending when looking out for places where the currency will be accepted especially at day to day shops. Again, compatibility of hardware and software is a problem that cannot be ignored.

4.3 Effect of Non Regulation

There are devastating effects of non-regulation or quasi regulation of crypto-currencies and its industry sector on consumers and the society in general. Given that attempting to regulate crypto-currencies through central authorities like the Central Bank may take away its peculiar feature of a decentralized currency, the industry sectors promoting the functionality of the

currency must be subjected to effective regulation across national borders. Without regulation the society will suffer the following effects:

- (a) **Fraud:** The crypto-market will be subject to irregularities at the exchanges caused by stakeholders who could fraudulently sweep the currency off the market to create a price hype and then sell back to the market at a fraudulently obtained price thus negatively affecting the volatility of the market. Fraud could also be perpetuated by exchanges and wallets who may fraudulently hack their own systems in order to make away with consumers investments. Without much ado, these providers could just cease to exist and leave the consumers in confusion.
- (b) **Security Issues:** Wallet and Payment providers are natural targets for hackers. Lack of regulation predisposes providers to running their services without adequate control procedures, insurance or recovery funds.
- (c) **Distributed Denial of Service (DDoS):** DDoS attack on the system could lead to a panic situation among users as the sudden denial of service will hamper transaction flow, money transfers and withdrawals.
- (d) **Theft:** Crypto-currencies can be easily stolen by operators or their staff especially where there are no laws to track, or provide safeguards.
- (e) **Promotion of Crimes and Terrorism:** The acquisition of equipment and mercenaries for crime and drugs will be easily sponsored as there are no trace procedures for the movement of funds.
- (f) **Financial Loss:** Trades and gains through the exchanges and mining are not taxed and looking at the market capitalisation, such financial loss is sizeable.
- (g) **Privacy:** Access to the public ledger by all those on the block-chain could substantially lead to invasion of privacy.
- (h) **Quantum Computing:** the security of algorithms and protocols used for the block-chain could be affected by new cryptanalytic challenges in quantum computing (ENISA, 2017).
- (i) **Money laundering:** The traceless and easy transfer of funds through the block-chain will no doubt aid money laundering.

4.4 Conclusion and Recommendations

Drawing conclusions from the paragraphs above, operating a crypto-currency system without an effective regulatory regime could be inimical to economic growth and consumer

protection. It could result in series of security threats both for government and investors. Of note however, is the unique characteristics of a crypto-currency which is, that the currency is ordinarily, decentralized. Advocating regulation therefore, is not to centralize or vest the control of the currency in a government or centrally regulated institution. If that is done, the currency will lose its unique character and will only become another fiat currency. Rather, what is advocated is the regulation of the drivers of this unique currency. As earlier mentioned, these drivers are the “wallets,” “exchanges,” “financial services provider,” and “miners.”

Money is based upon a social convention therefore; trusted central bodies must play a key role in promoting the development of an effective e-cash regime (Michelle, 2004). Therefore, private control of money nonetheless, Government must play a role in regulating the industries enabling crypto-currencies and create an enabling platform in the conversion of virtual currency to national currency. All providers must be licensed and subject to security checks, insurance and capitalization in the event of bankruptcy. The Know Your Customer (KYC) policy should be adopted across board with mandatory checks and records which need not necessarily be made open to the public but should be a pre- condition for transaction in order to give credibility to the transaction process.

Research for this paper has been limited by the unavailability of regulatory policies, model laws or treaties from international organisations such as the Organisation for Economic Cooperation and Development (OECD) and the United Nations. The European Union has had considerable contributions in the crypto-currency environment through various studies such as the “European Union Agency for Network and Information Security (ENISA) 2017.” There is however, need for future work in the area of regulating the crypto-currency environment. International instruments will no doubt, propel the ratification and development of national laws in this critical area of legal development.

Finally, this paper forms part of a continued research in the crypto-currency evolution and will provide a foundation for future work in the area of evaluating gaps in the regulatory framework of wallets and exchanges.

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